Amendments to the Specification

Please amend page 4, lines 11 and 12 as follows:

Figure 10 is a side view of a sixth embodiment of the present invention mounted on a portion of a hull of an airship or a submersible vessel;

Please amend page 5, lines 1 and 2 as follows:

Figure 15 is a front view of the eighth embodiment of the present invention, showing the spherical assembly fully retracted[[.]];

Please add the following on page 5, following line 2:

Figure 16A is a detail of the assembly shown in Figure 4B, showing a pneumatic or hydraulic extension and retraction means in a retracted configuration;

Figure 16B is a detail of the assembly shown in Figure 4A, showing a pneumatic or hydraulic extension and retraction means in an extended configuration;

Figure 16C is a detail of the assembly shown in Figure 4B, showing a microelectromechanical extension and retraction means with the assembly extended;

Figure 16D is a detail of the assembly shown in Figure 4A, showing a microelectromechanical extension and retraction means with the assembly retracted;

Please replace paragraph [0019] with the following amended paragraph:

[0019] A second exemplary embodiment of the present invention is shown in Figures 5A-5C and designated 110. This embodiment is an ~~iris-type~~ assembly similar in operation to a diaphragm shutter on a camera. This assembly ~~that~~ covers an aperture in the hull when fully extended, and exposes the aperture in the hull when fully retracted. Figure 5A shows assembly

38 in a fully extended configuration. Figure 5B shows the assembly in a partially extended configuration. Figure 5C shows the assembly in a fully retracted configuration.

Please replace paragraph [0020] with the following amended paragraph:

[0020] The assembly may be covered by a flexible membrane, as illustrated in Figures 6A-6C. Figure 6A shows embodiment 210 comprising fully extended assembly 38 covered by membrane 40. Membrane 40 has an aperture 42 in the center, which is substantially closed when the assembly is fully extended. Figure 6B shows assembly 38 partially retracted, opening aperture 42. Figure 6C shows assembly 38 fully retracted, opening aperture 42 to its widest extent. In some embodiments, membrane 40 is continuously attached to a hull (not shown) proximate to rim 250 and attached to pivot points 252 around opening 42. Then, as assembly 38 extends (Figure 6A), membrane 40 remains attached at points 252 and the portions of membrane 40 that were incident upon opening 42 flex/fold in an accordion-like fashion to take up the slack created by points 252 moving together. When assembly 38 retracts (Figure 6C), the membrane stretches between points 252. In an intermediate position (Figure 6B), membrane 40 may be partially stretched or may be partially flexed/folded.

Please replace paragraph [0021] with the following amended paragraph:

[0021] In embodiment 310, a non-circular assembly 74 is covered with plates as shown in Figures 7A-7C. Figure 7A shows embodiment 310 comprising fully extended assembly 74 partially covered by a plurality of plates 44. When assembly 74 is retracted, plates 44 are also retracted, forming an aperture. Figure 7B shows assembly 74 partially retracted, with the plurality of plates partially retracted. Figure 7C shows assembly 74 fully retracted, retracting plates 44 to their greatest extent. As should be readily apparent to one skilled in the art, other means of covering ~~an iris-type~~ a diaphragm shutter assembly are possible, and these modifications are intended to be within the spirit and scope of the invention as claimed.

For example, the plates or membrane may or may not be watertight when the assembly is fully extended. A watertight seal is not required for an aperture such as a bow thruster, as there is a watertight seal within the aperture. The present invention would serve to decrease drag when it is fully extended and the vessel is moving. However, the present invention could serve to both reduce drag and provide a watertight seal for an aperture in a vessel hull.

Please replace paragraph [0022] with the following amended paragraph:

[0022] Figure 8A shows ~~an iris-type~~ a diaphragm shutter assembly mounted on hull portion 78 of hull 76. Figure 8B shows assembly 74 fully retracted, forming aperture 75. Aperture 75 faces the forward direction of the hull. This embodiment may be used to cover, for example, a torpedo tube. However, any aperture in a hull may be covered in this manner.

Please replace paragraph [0023] with the following amended paragraph:

[0023] Figures 9A and 9B illustrate a fifth exemplary embodiment of the present invention. Hull 76 comprises apparatus 310. Apparatus 310 is ~~an iris-type~~ a diaphragm shutter assembly covered by plates 44. Apparatus 310 covers an aperture in hull 76 containing bow thruster 90. When bow thruster 90 is needed to maneuver the vessel, apparatus 310 is retracted to reveal aperture 75. When the bow thruster is no longer needed, apparatus 310 is extended to cover aperture 75, reducing the drag that would result from exposing aperture 75 during normal travel. An aperture for a water-jet, turbine, or any other aperture in a hull may be covered by apparatus 310 in a similar fashion.

Please replace paragraph [0025] with the following amended paragraph:

[0025] Figure 10 shows ~~airship~~ vessel 412 having passenger, payload, or instrument compartment 414. A variable hull section 410 is connected to the front and the back of the

~~airship~~ vessel. Assembly 438 (shown beneath a cutaway) is covered by flexible membrane 440. Assembly 438 expands and contracts to change the dimensions of the hull of the vessel. (Both front and rear assemblies are shown fully extended in Figure 10.) Fins ~~Vertical stabilizers~~ 416, ~~and horizontal stabilizers~~ 420, ~~as well as fins~~ and 418, are constructed to allow assembly 438 to expand and contract while the fins are moved to any position. Vessel 412 can be an airship or a submersible. Compartment 414 includes a hatch 422 and ports 424, both of which can be made fluid-tight.

Please replace paragraph [0026] with the following amended paragraph:

[0026] Figure 11 shows the front and rear assemblies fully contracted. This reduces the displacement of fluid ~~air~~ by the vessel. As with the previously discussed embodiments, there can be a flexible membrane over the assembly, within the assembly, or both over the assembly and within the assembly. The membrane may be used to contain a ~~lighter-than-air~~ fluid less dense than the intended environment, or may simply bound the interior of the vessel. (In the latter case, a ~~lighter-than-air~~ less dense internal fluid is held in containers within the hull of the aircraft.) All of the above embodiments are within the spirit and scope of the invention as claimed.

Please replace paragraph [0027] with the following amended paragraph:

[0027] Figures 12, 12A, and 13 show a vessel 512 having an ellipsoidal assembly 538 that extends and retracts conformally. Figure 12 is a rear view of ~~airship~~ vessel 512 with assembly 538 (shown beneath a cutaway of membrane 540) in a fully expanded configuration. Passenger compartment 514 is connected to the lower portion of the airship. Horizontal stabilizers 520 and vertical stabilizers 516 are connected to the assembly, and move relative to the passenger, payload, or instrument compartment when the assembly extends or retracts. Fins 518 may be fixed in size or also composed of assemblies 538. They are free to move throughout

the desired dynamic range regardless of the extent to which the hull assemblies are extended or retracted. As stated above, a flexible membrane covers the assemblies, is within the assemblies, or both. The membranes may be ~~air~~tight, allowing the less dense ~~lighter-than-air~~ fluid to be bounded by the membrane(s), or the less dense ~~lighter-than-air~~ fluid may be held in containers within the membrane(s). Vessel 512 can be an airship or a submersible. Compartment 514 includes a hatch 522 and ports 524, both of which can be made fluid-tight.

Please replace paragraph [0028] with the following amended paragraph:

[0028] Figures 14 and 15 show vessel ~~aircraft~~ 612 comprising a spherical hull 610. The spherical hull is an assembly 638 (shown beneath a cutaway of membrane 640) covered by membrane 640. Passengers, payload, or instruments may ~~ride~~ be carried within compartment 614. As with previous embodiments, the less dense ~~lighter-than-air~~ fluid may be contained within ~~airtight~~ fluid tight membranes covering, within, or both covering and within the assembly. The less dense ~~lighter-than-air~~ fluid may instead be held within containers within the hull. Vessel 612 can be an airship or a submersible. Compartment 614 includes a hatch 622 and ports 624, both of which can be made fluid-tight.

Please add the following two new paragraphs after paragraph [0028]:

[0028.1] Figures 16A and 16B show an extension and retraction means 700 for the truss assembly shown in Figures 4B and 4A, respectively, connected to a truss segment 702 of assembly 38. Means 700 includes a cylinder and piston arrangement 704. Arrangement 704 can be a pneumatic system or a hydraulic system. For the sake of clarity, the ancillary components of arrangement 704, such as fluid reservoirs, piping, and valves are not shown. In some embodiments, arrangement 704 is connected to truss segment 702 at pins 706 and 708. In some embodiments (not shown), truss segment 702 is connected to structural elements, such as element 710. In Figure 16A, means 700 is retracted, which results in the extended configuration

of assembly 38 shown in Figure 4B. In Figure 16B, means 700 is extended, which results in the retracted configuration of assembly 38 shown in Figure 4A.

[0028.2] Figures 16C and 16D show an extension and retraction means 800 for the truss assembly shown in Figures 4B and 4A, respectively, associated with a truss joint 802 of assembly 38. Figures 16C and 16D show one possible embodiment of a MEMs actuator. However, it should be understood that other types of MEMs actuators, including, but not limited to, linear MEMs actuators, for example, are included within the spirit and scope of the claims. Means 800 is a MEMS actuator. MEMS actuator 800 includes hub 804 and variable pole element 806. As shown in Figures 16C and 16D, hub 804 has a fixed north and south magnetic pole configuration. However, the magnetic configuration of element 806 is defined by the direction of electrical current flow as controlled by a switch (not shown). In Figures 16C and 16D, the current directions are reversed, resulting in the "flipping" of the north and south magnetic poles in element 806. In Figure 16C, the north and south poles of hub 804 and the south and north poles, respectively, of element 806 are mutually attracted, causing element 806 to assume the position shown. When the switch is flipped to reverse the direction of the electrical current, element 806 assumes the magnetic configuration shown in Figure 16D. Reversing the magnetic configuration of element 806 in Figure 16C causes a magnetic torque 808 as shown in Figure 16D. For example, switching from the magnetic polarity shown in Figure 16C to the magnetic polarity shown in Figure 16D causes the north poles of hub 804 and element 806, which are aligned, to push away from each other, causing element 806 to rotate counterclockwise. At the same time, the mutual attraction of the respective north and south poles of hub 804 and element 806 also causes element 806 to rotate counterclockwise. Thus, element 806 rotates from the position shown in Figure 16C to the position shown in Figure 16D. By reversing the direction of the electrical current flow again, element 808 can be made to rotate clockwise from the position shown in Figure 16D to the position shown in Figure 16C.

By reversing the direction of the electrical current flow again, element 808 can be made to rotate clockwise from the position shown in Figure 16D to the position shown in Figure 16C.